

TMDL COMPLIANCE FOR PATRICK AIR FORCE BASE AND CAPE CANAVERAL AIR FORCE STATION

RETHINKING STORMWATER POLLUTION MANAGEMENT



March 2011

Report Documentation Page				Form Approved OMB No. 0704-0188	
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE MAY 2011		2. REPORT TYPE		3. DATES COVERED 00-00-2011 to 00-00-2011	
4. TITLE AND SUBTITLE TMDL Compliance for Patrick Air Force Base and Cape Canaverl Air Force Station: Rethinking Stormwater Pollution Management				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) 45th Space Wing,Patrick AFB,FL				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES Presented at the NDIA Environment, Energy Security & Sustainability (E2S2) Symposium & Exhibition held 9-12 May 2011 in New Orleans, LA.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT Same as Report (SAR)	18. NUMBER OF PAGES 39	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

TMDL

TOTAL MAXIMUM DAILY LOAD

**MAXIMUM POLLUTANT LOADING THAT CAN
BE DISCHARGED TO A WATER BODY
WITHOUT DEGRADING ITS DESIGNATED USE**

FLORIDA TMDLS

**EXPRESSED AS MASS ANNUAL
LOAD REDUCTION**

POUNDS/YR OF TN OR TP

FLORIDA TMDL PROCESS

- EPA PASSES TMDL FOR EACH IMPAIRED WATER BODY IN STATE
- EPA DELEGATES ENFORCEMENT TO FDEP
- FDEP CREATES TMDL WITH EPA'S APPROVAL
- COMPLIANCE IS THROUGH BASIN MANAGEMENT ACTION PLAN (BMAP) PROCESS

TMDL COMPLIANCE

- **ENFORCEMENT IS THROUGH NPDES MS4 PERMIT**
- **PAFB HAS AN MS4 PERMIT**
- **CCAFS DOES NOT HAVE MS4 PERMIT – FDEP WILL PASS SECRETARIAL ORDER FOR CCAFS ENFORCEMENT**

WHY SHOULD AIR FORCE COMPLY WITH STATE REGULATION?

EPA WOULD STEP IN AND ENFORCE

**PUTS MILITARY INTO CIVILIAN
RULEMAKING AND COMPLIANCE ARENA!**

TMDL METHODOLOGY

- EACH WATERBODY ANALYZED INDEPENDENTLY TO DETERMINE POLLUTANTS OF CONCERN
- EACH WATERBODY HAS UNIQUE BIOLOGICAL BASED MODEL FOR POLLUTANT LOADINGS – PLSM, HSPF, SLAMM, ETC.
- **FDEP** DEVELOPS MODEL FOR OVERALL WATERBODY TO CALCULATE NUTRIENT REDUCTIONS REQUIRED BY ALL STAKEHOLDERS

BMAP PROCESS

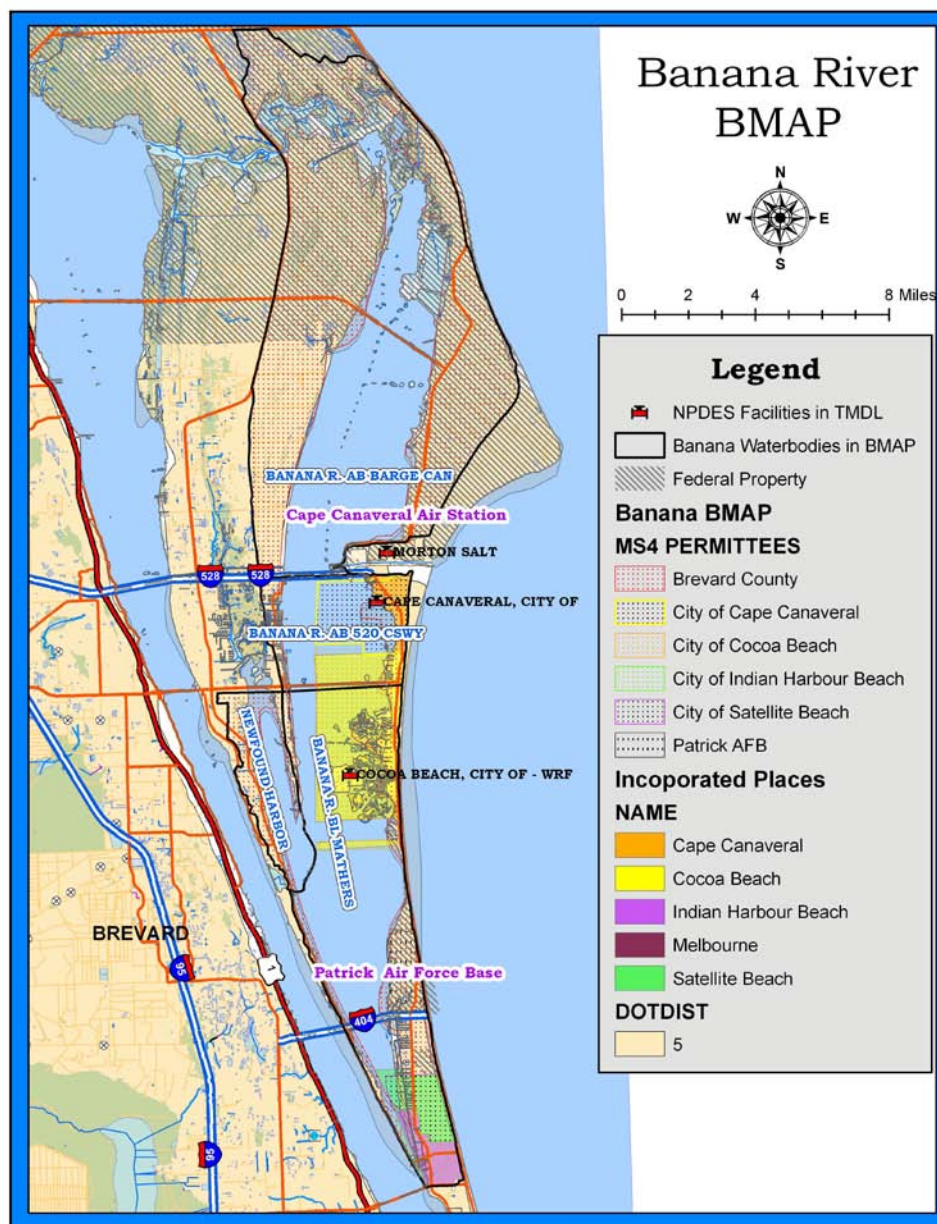
FDEP WORKS COLLABORATIVELY WITH STAKEHOLDERS TO:

- **DISTRIBUTE LOAD REDUCTIONS AMONG MS4 PERMITEES**
- **OBTAIN COMMITMENTS FROM PERMITEES FOR MEASURES TO REDUCE POLLUTANT LOADS**

MILITARY PARTICIPATES IN RULEMAKING

- **RULES ARE NOT HARDFAST**
- **MS4 ENTITIES MUST AGREE TO LOAD CALCULATION METHODS, ALLOCATION BETWEEN ENTITIES, AND METHODS UTILIZED FOR COMPLIANCE**
- **DISAGREEMENTS CAN BE NEGOTIATED WITH FDEP**

BANANA RIVER LAGOON PERMITEES



BANANA RIVER LAGOON (BRL) IMPAIRMENT

- **SEAGRASS COVERAGE HAS DECLINED**
- **RESTORE SEAGRASS TO HISTORIC LEVELS**
- **REDUCE OVERALL TN AND TP
THROUGHOUT BRL IN ATTEMPT TO
RESTORE SEAGRASS COVERAGES**
- **NO CAUSATIVE CORRELATION BETWEEN
NUTRIENTS AND SEAGRASSES**

PLSM POLLUTANT LOAD MODEL

- **GIS SPREADSHEET MODEL DEVELOPED BY ST JOHNS RIVER WATER MANAGEMENT DISTRICT IN 1995**
- **ADOPTED BY EPA AND FDEP**
- **USES YEAR 2000 COVERAGES**

PLSM VARIABLES

- LAND USE
- SOIL TYPE
- ANNUAL RAINFALL
- RUNOFF COEFFICIENT “C”
- POLLUTANT CONCENTRATION BY LAND USE

PLSM CALCULATIONS

Basin ID	Land Use and Soil	Annual C	TN mg/L	TP mg/L	Annual Rainfall in	Area ac	Volume ac-ft/yr	Treatment	TN Reduction	TP Reduction	TN Load lb/yr	TP Load lb/yr
1A	1730 C	0.77	1.80	0.48	46.66	2.47	7.38	No	1.00	1.00	36.14	9.60
1A	8140 C	0.78	1.18	0.48	46.66	0.16	0.49	No	1.00	1.00	1.59	0.65
1A	8140 C	0.78	1.18	0.48	46.66	0.30	0.91	No	1.00	1.00	2.93	1.19
1A	8140 C	0.78	1.18	0.48	46.66	0.06	0.19	Yes	0.70	0.50	0.42	0.12
	Total					3.00	8.98				41.08	11.56

BANANA RIVER LAGOON BMAP ALLOCATIONS

JULY 2010

Banana River Lagoon (BRL) Basin Management Action Plan (BMAP) Required Reductions

Required TN Reductions for the BRL BMAP

Entity	Area (acres)	TN Target (lbs/acre)	TN Target (lbs)	Base Load (lbs)	Required Reduction (lbs)	Required Reduction (%)	BMAP 1 Required Reduction (lbs)
Brevard County	10,470	2.32	24,283	75,489	51,206	67.8%	17,068.7
Cape Canaveral	856	2.32	1,985	8,945	6,960	77.8%	2,320.2
Cape Canaveral AFS	13,795	2.32	31,994	53,007	21,013	39.6%	7,004.4
Cocoa Beach	1,857	2.32	4,307	18,759	14,452	77.0%	4,817.5
FDOT 5	386	2.32	895	3,741	2,846	76.1%	948.5
Indian Harbour Beach	1,251	2.32	2,901	11,908	9,007	75.6%	3,002.4
Kennedy Space Center	18,540	2.88	53,324	70,816	17,492	24.7%	5,830.7
Patrick AFB	2,134	2.32	4,948	28,994	24,046	82.9%	8,015.3
Satellite Beach	1,488	2.32	3,451	13,952	10,501	75.3%	3,500.3
<i>de minimus</i>	609	-	2,954	2,954	0	0.0%	0.0
Total	51,385	-	128,087	288,565	157,524	54.6%	52,508.0

Required TP Reductions for the BRL BMAP

Entity	Area (acres)	TP Target (lbs/acre)	TP Target (lbs)	Base Load (lbs)	Required Reduction (lbs)	Required Reduction (%)	BMAP 1 Required Reduction (lbs)
Brevard County	10,470	0.344	3,606	14,741	11,135	75.5%	3,711.8
Cape Canaveral	856	0.344	295	1,957	1,663	84.9%	554.2
Cape Canaveral AFS	13,795	0.344	4,751	10,790	6,039	56.0%	2,013.0
Cocoa Beach	1,857	0.344	640	3,781	3,141	83.1%	1,047.2
FDOT 5	386	0.344	133	1,076	943	87.6%	314.4
Indian Harbour Beach	1,251	0.344	431	2,092	1,662	79.4%	553.8
Kennedy Space Center	18,540	0.344	6,385	8,576	2,191	25.5%	730.4
Patrick AFB	2,134	0.344	735	7,500	6,766	90.2%	2,255.2
Satellite Beach	1,488	0.344	512	2,462	1,949	79.2%	649.8
<i>de minimus</i>	609	-	566	566	0	0.0%	0.0
Total	51,385	-	18,053	53,543	35,489	66.3%	11,829.7

BRL BMAP ALLOCATIONS

- **NOT END OF PIPE CONCENTRATION BASED!**
- **15 YEARS TO MEET ANNUAL LOAD REDUCTIONS**
- **MEET 1/3 OF REDUCTION IN 3 EQUAL 5 YEAR CYCLES**
- **REASSESS SEAGRASS COUNTS AT END OF EACH 5 YEAR CYCLE AND ADJUST ALLOCATIONS IF NEEDED**

REDUCTIONS FROM EXISTING DEVELOPED AREAS

- **NOT ASSOCIATED WITH EISA 438 OR STATE PERMITTING REQUIREMENTS OF 1.5 INCHES OF TREATMENT VOLUME**
- **ASSUME NEW DEVELOPMENT CREATES NO NEW POLLUTANT LOADS**
- **ALL COMPLIANCE BY RETROFITTING EXISTING DEVELOPED AREAS TO REDUCE EXISTING LOADINGS**

MODEL REVIEW

- **INACCURATE COVERAGES FOR 2000**
- **SEAGRASSES HAVE REBOUNDED**
- **OVERESTIMATION OF RUNOFF VOLUMES AND POLLUTANT LOADS**
- **FDEP INTERDEPARTMENTAL DISPUTES ON MODELING METHODS**



PAFB INACCURATE LAND USE COVERAGE

Patrick Air Force Base
2000 SJRWMD FLUCCS
Brevard County, Florida
Frame 4 of 6

Key:

USAF Boundary

Code	Description
1	1.0000000000000000
2	2.0000000000000000
3	3.0000000000000000
4	4.0000000000000000
5	5.0000000000000000
6	6.0000000000000000
7	7.0000000000000000
8	8.0000000000000000
9	9.0000000000000000
10	10.0000000000000000
11	11.0000000000000000
12	12.0000000000000000
13	13.0000000000000000
14	14.0000000000000000
15	15.0000000000000000
16	16.0000000000000000
17	17.0000000000000000
18	18.0000000000000000
19	19.0000000000000000
20	20.0000000000000000
21	21.0000000000000000
22	22.0000000000000000
23	23.0000000000000000
24	24.0000000000000000
25	25.0000000000000000
26	26.0000000000000000
27	27.0000000000000000
28	28.0000000000000000
29	29.0000000000000000
30	30.0000000000000000
31	31.0000000000000000
32	32.0000000000000000
33	33.0000000000000000
34	34.0000000000000000
35	35.0000000000000000
36	36.0000000000000000
37	37.0000000000000000
38	38.0000000000000000
39	39.0000000000000000
40	40.0000000000000000
41	41.0000000000000000
42	42.0000000000000000
43	43.0000000000000000
44	44.0000000000000000
45	45.0000000000000000
46	46.0000000000000000
47	47.0000000000000000
48	48.0000000000000000
49	49.0000000000000000
50	50.0000000000000000
51	51.0000000000000000
52	52.0000000000000000
53	53.0000000000000000
54	54.0000000000000000
55	55.0000000000000000
56	56.0000000000000000
57	57.0000000000000000
58	58.0000000000000000
59	59.0000000000000000
60	60.0000000000000000
61	61.0000000000000000
62	62.0000000000000000
63	63.0000000000000000
64	64.0000000000000000
65	65.0000000000000000
66	66.0000000000000000
67	67.0000000000000000
68	68.0000000000000000
69	69.0000000000000000
70	70.0000000000000000
71	71.0000000000000000
72	72.0000000000000000
73	73.0000000000000000
74	74.0000000000000000
75	75.0000000000000000
76	76.0000000000000000
77	77.0000000000000000
78	78.0000000000000000
79	79.0000000000000000
80	80.0000000000000000
81	81.0000000000000000
82	82.0000000000000000
83	83.0000000000000000
84	84.0000000000000000
85	85.0000000000000000
86	86.0000000000000000
87	87.0000000000000000
88	88.0000000000000000
89	89.0000000000000000
90	90.0000000000000000
91	91.0000000000000000
92	92.0000000000000000
93	93.0000000000000000
94	94.0000000000000000
95	95.0000000000000000
96	96.0000000000000000
97	97.0000000000000000
98	98.0000000000000000
99	99.0000000000000000
100	100.0000000000000000

Overview



Source: ESRI 2008; Bing Maps 2009;
Specpro 2009; SJRWMD 2000 FLUCCS.



1 inch = 300 feet



CCAFS IN ACCURATE SOILS

Cape Canaveral
SSURGO Soils
Brevard County, Florida
Frame 4 of 6

Key:

USAF Boundary

Soils

A

B

B/C

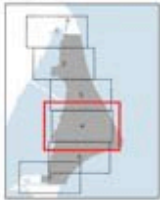
C

D

U

W

Overview



Sources: ESRI 2008; USFWS WVI;
Ring Maps 2009; Spersco 2009; 2005 NRCS.



1 in = 1,000 ft



PAFB CREDITS FOR BMPS CONSTRUCTED PRE 2000



- TMDL Jurisdictional Boundary - E&E and SSI
- ERP Projects Area - USAF
- Treatment Area - FDEP



Treatment Grid & ERP Projects

Frame 5 of 8
Patrick Air Force Base
Brevard County, Florida
TMDL study by E&E and SSI

Date: 8/21/2010
Source: BingMaps, 2010; FDEP 2010

NEGOTIATED COST REDUCTIONS

July 2010 First 5 Year Reduction				April 2011 First 5 Year Reduction		
	TN Reduction lb/yr	TP Reduction lb/yr	Project Costs	TN Reduction lb/yr	TP Reduction lb/yr	Project Costs
CCAFS	7,004	2,013	\$7,478,439	3,140	948	\$2,478,000
PAFB	8,015	2,255	\$3,860,396	3,046	875	\$1,241,424

RETROFITTING – DIFFICULT CONSTRUCTION



BMP SELECTION

- WET DETENTION PONDS
- DRY RETENTION PONDS
- BEEMATS FLOATING WETLANDS
- REUSE OF GOLF COURSE LAKE WATER

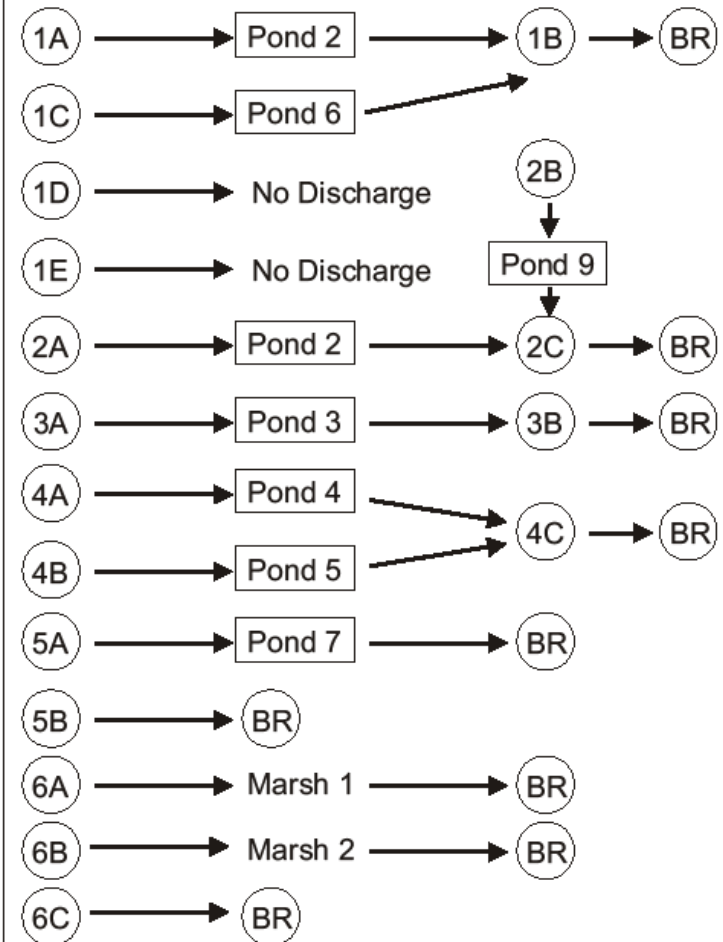


PAFB POLLUTANT FLOW PATH NODE DIAGRAM

02-002885.SP16.02.CCAFS_PG1.cdr-6/28/10-GRA



ecology and environment, inc.
Global Specialists in the Environment



SOURCE: Ecology and Environment, Inc. 2010

6/28/2010

© 2010 Ecology and Environment, Inc.

CCAFS Node Diagram

WET DETENTION POND REMOVAL EFFICIENCIES

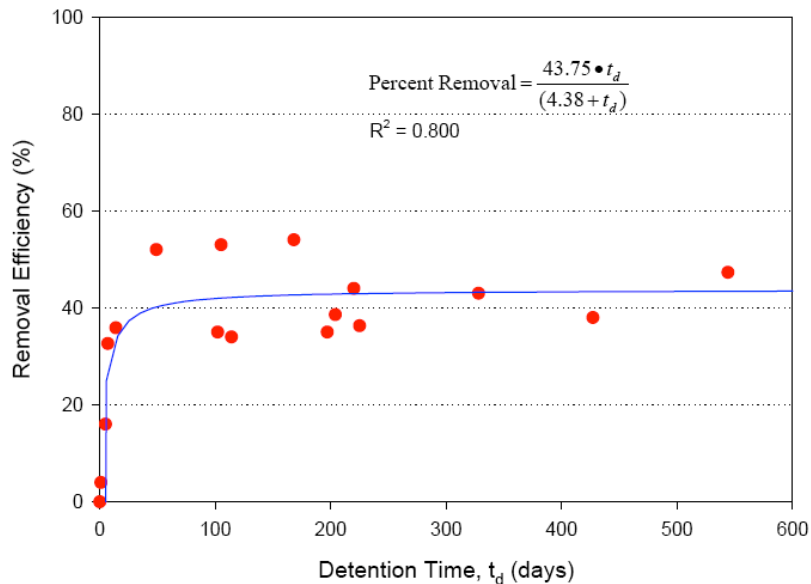
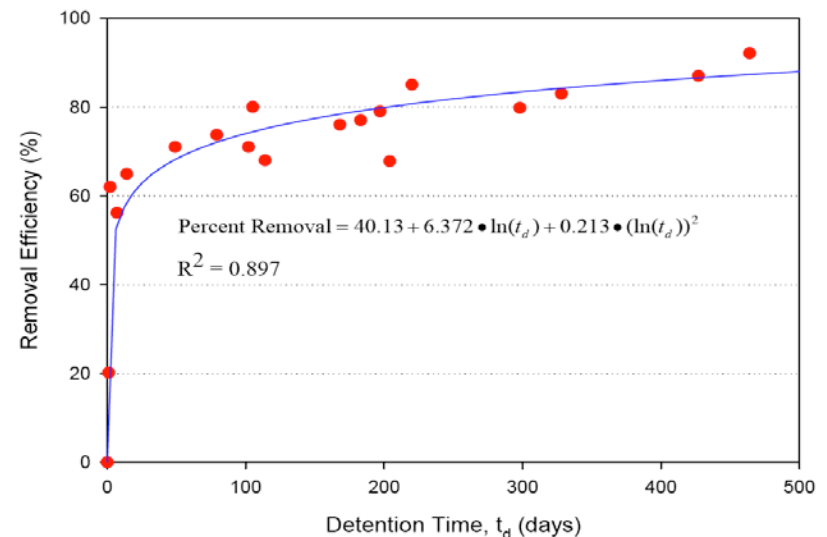


Figure 5-10. Removal Efficiency of Total Nitrogen in Wet Detention Ponds as a Function of Residence Time.

TP Removal Efficiency



BMP REMOVAL EFFICIENCIES

BMP	TP % Reduction	TN % Reduction
Retention BMPs (basin, exfiltration, etc.)	Based on DCIA, non-DCIA CN, and Rainfall Zone	Based on DCIA, non-DCIA CN, and Rainfall Zone
Wet Detention Ponds	Annual Residence Time	Annual Residence Time
Dry Detention	10	10
Treatment Trains	Use BMP Treatment Train (TT) equation: $\text{BMP TT Efficiency} = \text{Eff1} + ((1 - \text{EFF1}) * \text{Eff2})$	Use BMP Treatment Train (TT) equation: $\text{BMP TT Efficiency} = \text{Eff1} + ((1 - \text{EFF1}) * \text{Eff2})$
Baffle Box	2.3	0.5
Nutrient Baffle Box	15.5	19.05
Catch Basin Inserts, inlet filters	Based on pounds material removed	Based on pounds material removed
Grass Swales with swale blocks or raised culverts	Use retention BMPs above	Use retention BMPs above
Alum Injection	90	50
Provisional BMPs	TP % Reduction	TN % Reduction
Street Sweeping	Pounds material removed x concentration from FSA study	Pounds material removed x concentration from FSA study
Stormceptor	13	2
CDS Unit	10	NA
Public Education	1-6, depending on program	1-6, depending on program

PAFB TMDL PROJECTS

First Five Year Cycle Recommended Structural Best Management Practices						
Project No.	BMP Type	TN Reduction (lb/yr)	TP Reduction (lb/yr)	Estimated Cost	Cost per pound TN Removed	Cost per Pound TP Removed
4B	Beemats	509.24	811.31	\$59,629	\$117	\$ 73
24B	Beemats	55.65	14.78	\$10,468	\$188	\$708
26A	Reuse	3,056.32	965.42	\$850,000	\$278	\$880
22	Dry Pond	67.84	18.01	\$25,000	\$369	\$1,388
28	Dry Pond	164.12	43.58	\$75,600	\$461	\$1,735
5A	Dry Swale	24.75	6.57	\$15,000	\$606	\$2,283
4A	Wet Pond	799.58	383.53	\$504,900	\$631	\$1,316
11	Dry Pond	82.22	21.83	\$52,920	\$644	\$2,424
26B	Beemats	916.44	241.36	\$605,806	\$661	\$2,510
13	Dry Pond	39.81	10.84	\$36,590	\$919	\$3,375
5B	Dry Swale	16.88	4.45	\$16,223	\$961	\$3,646
2	Dry Pond	24.76	6.58	\$24,192	\$977	\$3,678
10	Dry Pond	27.78	7.38	\$27,972	\$1,007	\$3,792
12	Dry Swale	35.22	9.35	\$36,288	\$1,030	\$3,881
23	Dry Pond	25.60	6.80	\$27,972	\$1,093	\$4,113
8	Dry Pond	44.22	11.74	\$56,700	\$1,282	\$4,828
9	Dry Pond	9.96	2.65	\$13,797	\$1,385	\$5,214
3	Dry Swale	16.10	4.28	\$30,000	\$1,863	\$7,011
21	Dry Swale	6.74	1.79	\$12,569	\$1,864	\$7,009
16	Dry Pond	39.63	11.24	\$84,718	\$2,137	\$7,540
24A	Wet Pond	101.45	45.69	\$226,800	\$2,236	\$4,964
6	Dry Pond	11.42	3.03	\$31,450	\$2,753	\$10,364
7	Dry Pond	18.89	5.02	\$76,356	\$4,041	\$15,219
1	Wet Pond	130.22	58.75	\$661,500	\$5,080	\$11,260
27	Dry Pond Expansion	32.42	8.61	\$227,764	\$7,026	\$26,458
15	Dry Pond	5.76	1.53	\$70,182	\$12,192	\$45,757
Total		6,263.03	2,706.11	\$3,860,396		

PAFB PROPOSED BMPS

Patrick Air Force Base
Proposed Project Locations
TMDL study by E&E and SSI
Brevard County, Florida

Oct 21, 2010

Frame 2 of 6

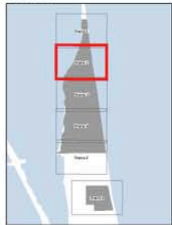
Key

— Proposed Project

▭ Subbasins

▭ USAF Boundary

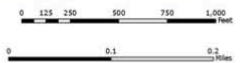
Overview



Source:
MS Virtual Earth Aerial 2008
SSI Basin Boundaries 2010
SSI Proposed Projects 2010



1 inch = 300 feet



CCAFS PROPOSED PROJECTS

Cape Canaveral Air Force Station
Proposed Project Locations
TMDL study by E&E and SSI
Brevard County, Florida

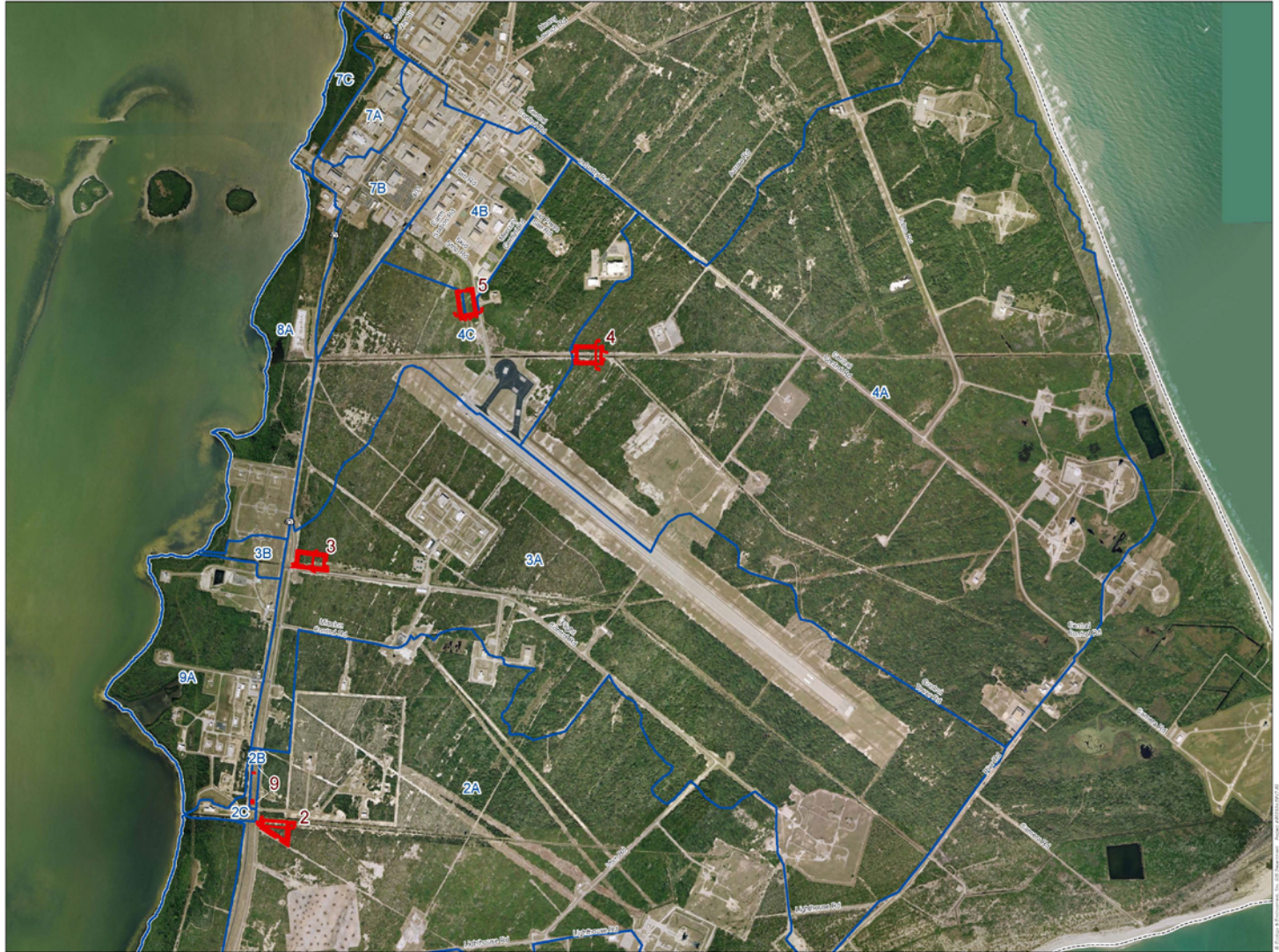
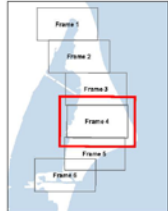
Oct 15, 2010

Frame 4 of 6

Key

- Proposed Project
- Subbasins
- USAF Boundary

Overview



Source:
MS Virtual Earth Aerial 2008
SSI Basin Boundaries 2010
SSI Proposed Projects 2010
ESRI 2009



1 inch = 1,000 feet



CCAFS TMDL PROJECTS

Project No.	BMP Type	Acres Treated	TN Removed (lb/yr)	TP Removed (lb/yr)	Estimated Cost	Cost per Lb TN Removed/Yr	Cost per Lb TP Removed/Yr
11	Beemats	208.32	436.0	113.1	\$22,477	\$52	\$199
6	Dry Swales	5.66	32.9	9.6	\$10,000	\$304	\$1,045
10	Dry Pond	7.97	44.1	12.7	\$35,000	\$793	\$2,756
3	Wet Pond	1434.8	1,403.1	800.6	\$1,204,000	\$858	\$1,504
4	Wet Pond	1747.16	1,171.0	583.7	\$1,274,000	\$1,088	\$2,183
1	Wet Pond	1202.61	729.6	371.2	\$854,000	\$1,171	\$2,300
7	Wet Pond	2044.03	2,269.9	879.3	\$2,744,000	\$1,209	\$3,120
2	Wet Pond	1284.63	731.7	283.4	\$1,218,000	\$1,665	\$4,298
5	Wet Pond	153.42	573.8	247.8	\$1,036,000	\$1,806	\$4,181
9	Dry Swales	3.91	37.5	15.3	\$85,000	\$2,265	\$5,568
15	Dry Pond	3.87	22.5	6.5	\$54,432	\$2,418	\$8,324
Totals		7,888	7,430	3,317	\$8,536,909		

PAFB COMPLIANCE STRATEGY

	TN (lb/yr)	TP (lb/yr)
FDEP Required 15 Year Reduction	20,306	5,835
FDEP Required 5 Year Reduction	3,046	857
Reduction for Post 2000 ERP Projects	303	68
Remaining 5 Year Reductions Required	2,743	789
Calculated Reduction with DR Factor	5,063	1,326
Calculated Reduction with LU and Soil Reclassification	19,529	5,997
Calculated Reduction with North and Central Base Housing Treatment Credits	749	336
Total Reductions from Model Refinements	25,341	7,659

CCAFS COMPLIANCE STRATEGY

	TN (lb/yr)	TP (lb/yr)
FDEP Required 15 Year Reduction	20,938	6,320
FDEP Required 5 Year Reduction	3,141	948
Existing Industrial Area Project Credit	865	380
Predicted Reduction with DR Factor	8,631	927
Predicted Reduction with Soil Reclassification	6,171	842
Total Reduction from Model Adjustments	15,667	2,149

SEDIMENT REMOVAL OPERATIONS

STORMWATER SOLUTIONS SEDIMENT TRACKER DATABASE

IS YOUR COMMUNITY
RECEIVING NPDES MS4 AND
TMDL CREDITS FOR THEIR
SEDIMENT CLEANING
ACTIVITIES?

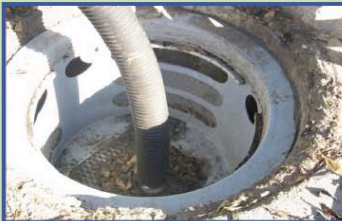
STORMWATER SOLUTIONS
HAS THE
ANSWER FOR YOU!

BY TRACKING YOUR PUBLIC
WORKS ACTIVITIES WITH OUR
UNIQUE SEDIMENT TRACKING
DATABASE, POLLUTANTS IN
SEDIMENTS CAN EASILY BE
CALCULATED AND REPORTED

USE OUR MICROSOFT ACCESS
DATABASE TO SCHEDULE, TRACK, AND
REPORT STREET SWEEPING, BMP
CLEANING, DITCH CLEANING, AND
PIPE CLEANING ACTIVITIES

BENEFITS:

- AUTOMATICALLY CALCULATES USER DEFINED POLLUTANT MASSES SUCH AS TSS, HEAVY METALS, TOTAL PHOSPHORUS AND TOTAL NITROGEN
- CALCULATED POLLUTANTS CAN BE USED TO OFFSET TMDL ALLOCATIONS AND REDUCE RETROFIT COSTS!
- SHOWS COMPLIANCE WITH NPDES MS4 REPORTING REQUIREMENTS
- EASY TO USE, INTUITIVE DATA ENTRY
- SCHEDULE AND RECORD MONTHLY SEDIMENT CLEANING ACTIVITIES
- END OF YEAR REPORT SUMMARIES



Sediment Tracking Report

From: Saturday, March 22, 2008 To: Tuesday, March 17, 2009

Activity Name	Sediment Removed	Vegetation Removed
Street Sweeping (cy)	153.00	11.00
Pipe Cleaning (cy)	4.00	0.00
Ditch Cleaning (cy)	55.00	12.00
BMP Cleaning		
Inlet (cy)	27.50	27.00
Vault (cy)	0.00	0.00

Pollutant Name	Activity Name	Pollutant Concentration - Sediment (mg/kg)	Pollutant Concentration - Vegetation (mg/kg)	Pollutant Removed - Sediment (kg)	Pollutant Removed - Vegetation (kg)	Pollutant Total Removed (kg)
TH	Street Sweeping	5.00	2.00	0.63	0.00	0.63
	Ditch Cleaning	8.00	3.00	0.41	0.00	0.41
	BMP Cleaning	5.00	2.00	0.00	0.00	0.00
				1.04	0.00	1.04
TP	Pipe Cleaning	44.00	3.00	0.12	0.00	0.12
				0.12	0.00	0.12
Grand Total				1.16	0.00	1.16

GORDON ENGLAND, P.E., D.WRE
STORMWATER SOLUTIONS, INC.
760 S. BREVARD AVE. #421
COCOA BEACH, FLORIDA 32951
321-783-8283/321-783-8837 FAX
gengland@stormwatersolutionsinc.com

Sediment Tracking Report

Basin Name: Old Tampa Bay

From: 07/10/2008

To: 07/12/2009

SEDIMENT TRACKER

Activity Name		Sediment Removed	Vegetation Removed
Street Sweeping (cy)		41.000	3.000
Pipe Cleaning(cy)		64.000	469.000
Ditch Cleaning(cy)		102.000	25.000
BMP Cleaning	Inlet (lb)	922.000	959.000
	Vault (cy)	5.830	0.970

Activity Name		Sediment Density (lb/cf)	Vegetation Density (lb/cf)	Sediment Removed (lb)	Vegetation Removed (lb)
Street Sweeping		100.00	200.00	110,700.00	16,200.00
Pipe Cleaning		20.00	10.00	34,560.00	126,630.00
Ditch Cleaning		50.00	60.00	137,700.00	40,500.00
BMP Cleaning	Inlet	NA	NA	922.00	959.00
	Vault	20.00	200.00	3,150.00	5,250.00

Pollutant Name	Activity Name	Pollutant Concentration Sediment (mg/kg)	Pollutant Concentration Vegetation (mg/kg)	Pollutant Removed Sediment (kg)	Pollutant Removed Vegetation (kg)	Total Pollutant Removed (kg)
Hg						
	Street Sweeping	4,882.000	25.000	244.540	0.180	
				244.540	0.180	244.730
TN						
	Street Sweeping	12.000	25.000	0.600	0.180	
	Pipe Cleaning	87.000	22.000	1.360	1.260	
	Ditch Cleaning	808.000	222.000	50.340	4.070	
	BMP Inlet Cleaning	333.000	122.000	0.140	0.050	
				52.450	5.570	58.010

NEGOTIATION SCHEDULE

- **12 – 24 MONTHS, MAYBE MORE**
- **STATE POLITICS WILL DRIVE SCHEDULE AND COMPLIANCE**

INDIAN RIVER COALITION

- **CITIES AND BASES COMBINE RESOURCES AND FUNDS TO CREATE NEW TMDL OVER NEXT 2 - 3 YEARS**
- **REASSESS SEAGRASS**
- **DEVELOP NEW MODEL**

LESSONS LEARNED

- **CIVILIAN PROCESS**
- **TMDLS AND MODELS WILL BE DIFFERENT AT EVERY BASE**
- **BMPS WILL BE DIFFERENT FOR EVERY TMDL**
- **PROACTIVE PARTICIPATION IN RULEMAKING**
- **USE SPECIALTY TMDL CONSULTANT FOR CIVILIAN POLITICS AND RULEMAKING**